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1764

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In Re Application of:
WILLIBRORD A. GROTEN

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Atty File: CDT 1756-2

Serial No.: 10/015,863

Group Art Unit: 1764

Filed: 12/12/2001

Examiner: W. D. GRIFFIN.

For: PROCESS FOR SULFUR REDUCTION IN NAPHTHA STREAMS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

1. Transmitted herewith in triplicate is the APPEAL BRIEF in this application with respect to the Notice of Appeal.

2. STATUS OF APPLICANT

This application is on behalf of
☒ other than a small entity
☐ small entity

3. ☐ Applicant hereby petitions for an extension of time of (1) month for filing the Brief from the Notice of Appeal filed _____ as provided in 37 CFR 1.136 (a).
☐ a fee in the amount of \$ 120.00
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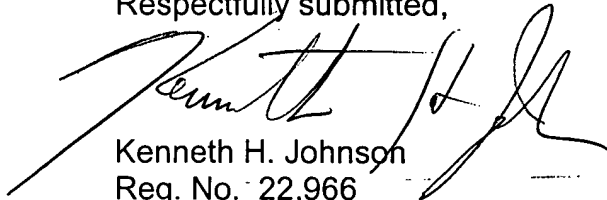
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Respectfully submitted,



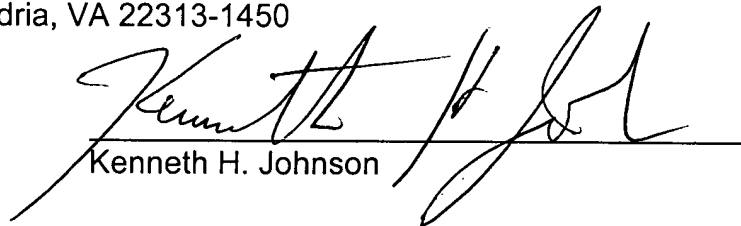
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Kenneth H. Johnson



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BRIEF ON APPEAL

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I.

REAL PARTY IN INTEREST

The subject patent application is assigned of record to Catalytic Distillation Technologies. Therefore, the real party in interest is Catalytic Distillation Technologies

II.

RELATED APPEALS

There are no related appeals or interferences known to appellant or appellant's legal representative which will directly or indirectly affect or be affected by or have a bearing on the Board's decision in this appeal. The appeal and a Brief have been previously filed. The examiner withdrew the final and made a fresh rejection in view of the prior Brief.

III.

STATUS OF CLAIMS

Claims 11-16 remain in the application. All of the claims were rejected. Claims 11-16 are on appeal.

IV.

STATUS OF AMENDMENTS

All amendments have been entered.

V.

SUMMARY OF THE INVENTION CLAIMED ON APPEAL

The present invention relates to a process for concurrently fractionating and hydrotreating a full range naphtha which is split into a light boiling range naphtha, a medium boiling range naphtha and a heavy boiling range naphtha and each boiling range naphtha is treated separately to achieve a combined desired total sulfur content. (Spec page 1, ln 4-9.) A light FCC naphtha cut in the splitter just below the light fraction also contains mercaptans and a significant amount of thiophenes. The mercaptans in this cut

may be removed by the thioetherification. The total sulfur content of the thiophene cut is relatively low and more significantly does not require as severe treatment as the sulfur compounds in the heavy fraction to convert the thiophene to H_2S , thus the olefins in the thiophene cut are less likely to be hydrogenated. Spec, paragraph bridging pages 3 and 4.

The following summary is taken verbatim from the patent application at page 4 line 15 to line 25.

“Preferably the process comprises the steps of:

(a) separating the full boiling range cracked naphtha stream into three fractions comprising a light cracked naphtha fraction, preferably boiling in the range of C_5 to about $150^{\circ}F$, an intermediate cracked naphtha fraction preferably boiling in the range of about 150 to about $250^{\circ}F$ and a heavy cracked naphtha preferably boiling in the range of about 250 to $450^{\circ}F$;

(b) subjecting the heavy cracked naphtha to hydrodesulfurization in a first hydrodesulfurization reactor containing a hydrodesulfurization catalyst; and

(c) combining the effluent from the first hydrodesulfurization reactor with the intermediate cracked naphtha and subjecting the combined stream to hydrodesulfurization in a second hydrodesulfurization reactor.”

A preferred process is one in which “The light naphtha in flow line 102 is treated by a wet caustic wash to in reactor 20 remove the mercaptans and taken as product via flow line 103...”. Spec. page 8, lines 17 -18. Abstract lines 10-11.

VI.
ISSUE

1. Are claims 11-16 *prima facie* obvious over Fletcher et al (US 5290427)?

VII.
GROUPING OF CLAIMS

Claims 11-16 are grouped together in view of the nature of the rejection.

VIII.
ARGUMENT

A. The Rejection

In the Final Office Action:

Claims 11-16 were rejected under 35 USC 103(a) over Fletcher et al (US 5290427).

B. Issue

ARE CLAIMS 11-16 *PRIMA FACIE* OBVIOUS OVER FLETCHER ET AL (US 5290427)?

The examiner admits that Fletcher et al (Fletcher) is deficient in that it

1. "does not disclose the use of two separate hydrodesulfurization reactors" and
2. "does not disclose the boiling ranges for the fractions".

Fletcher discloses a process for sweetening a naphtha stream, which requires an initial step in which the full stream is treated to convert mercaptans into heavier compounds (Abstract, col. 2, lines 29-33, col. 7, lines 19-21 and otherwise generally in the specification and claims) in order to remove the mercaptans from the lighter portion of the naphtha into the heavier portion, then the treated full boiling stream is fractionated to remove the mercaptan free lighter portion away from the heavy portion where the sulfur compounds are segregated. The higher boiling fraction which contains the sulfur compounds is then hydrodesulfurized, under conventional conditions (col. 8, line 24 *et*

seq. Those of skill in the art would understand from this that the entire heavy fraction is used to reduce the sulfur content to the desired level by the severe treatment conditions described which would result in the reduction of the olefins in that fraction which applicant constitutes as the intermediate fraction.

However, in the present invention the full boiling range naphtha feed is first divided into 3 streams,. the heavy stream is hydrodesulfurized and recombined with the intermediate stream. The recombined stream is then hydrodesulfurized. as disclosed in the paragraph bridging pages 3 and 4 of the specification;

"It has now been found that the light FCC naphtha cut in the splitter just below the light fraction also contains mercaptans and a significant amount of thiophenes. The mercaptans in this cut may be removed by the thioetherification. The total sulfur content of the thiophene cut is relatively low and more significantly does not require as severe treatment as the sulfur compounds in the heavy fraction to convert the thiophene to H_2S , thus the olefins in the thiophene cut are less likely to be hydrogenated."

The initial split of the stream in the present invention thus is **required to create** an intermediate stream, where the sulfur compounds are more easily hydrodesulfurized than those in the heavy stream. The milder treatment of the combined heavy and intermediate streams preserves the olefins and thus octane of the naphtha. This is the **exact opposite of what Fletcher does**. Fletcher hydrodesulfurizes **the equivalent of the combined stream**, thereby unnecessarily destroying olefins and depleting the octane of the steam.

The examiner relies heavily on Fletcher's noting that the treated feed may be fractionated to two or more fractions (col. 4, lines 18-20), there is no further discussion of that or any reason for such additional cuts. In fact in the next sentence Fletcher effectively negates any implication of more than 2 streams, i.e., "The lower boiling fraction...may be

blended directly to the into the gasoline pool. the higher boiling fraction". There are **just two** fractions discussed and disclosed in the entire remainder of the reference. There is nothing any person even of very high skill in the art could gleam from Fletchers passing comment.

Fletcher proceeds that the higher boiling fraction which contains the sulfur compounds is then hydrodesulfurized, under conventional conditions (col. 8, line 24 *et seq.* Those of skill in the art would understand from this that the entire heavy fraction is used to reduce the sulfur content to the desired level by the severe treatment conditions described which would result in the reduction of the olefins in that fraction which applicant constitutes as the intermediate fraction.

The examiner conceded that Fletcher is deficient in that it "does not disclose the boiling ranges for the fractions". Although, the limitations of the boiling ranges are not "critical" in the legal sense of that term as used in the art, they are essential in defining that cut which is removed from the heavies, to preserve the olefins, which is basically the point of the present invention.

Fletcher teaches that the contribution to octane from olefinic compounds is in the front end (light fraction) and any olefin in the heavies will be saturated (See Abstract, Ins. 13-14; col. 3, Ins. 17-20; col. 3, Ins. 50-52), preserving the olefins in the heavies what the present invention seeks to achieve, while Fletcher readily saturates the olefins in the heavies as part of its process. A claimed method which involves doing what the reference tries to avoid is the very antithesis of obviousness. *In re Buehler*, 185 USPQ 781(CCPA 1975).

In the present claimed invention the fully boiling range cracked naphtha is first fractionated into three fractions, a light (C_5 to about 150°F), an intermediate (150 to about 250°F) and a heavy (250 to 450°F). The heavy is first hydrodesulfurized, then combined with the intermediate and the combined streams hydrodesulfurized. The light FCC naphtha cut in the splitter just below the light fraction also contains mercaptans and a significant amount of thiophenes. The total sulfur content of the thiophene cut is relatively low and more significantly does not require as severe treatment as the sulfur compounds in the heavy fraction to convert the thiophene to H_2S , thus the olefins in the thiophene cut (intermediate cut) are less likely to be hydrogenated (Spec. page 3, line 29-page 4- line 3), unlike the Fletcher process where the intermediate fraction is treated as one with the heaviest fraction. In addition by separating the intermediate cut and the heavy cut the quantity of feed subjected to severe hydrotreating conditions is reduced, thus reducing the size and capital investment of the hydrodesulfurization distillation column reactor for the most severe service. The polishing reaction where the previously treated heavy fraction and intermediate fraction are combined is operated under less severe hydrotreating conditions and thus the equipment is less costly on that count as well as the preservation of the olefins.

In this preferred embodiment the light fraction is separately treated by a wet caustic wash wherein substantially all of the mercaptans are converted to sulfides which are easily separated by fractionation, whereas Fletcher treats the entire stream with caustic wash.

Conceptually as well as factually the present invention is distinguished from that of Fletcher in that it is the separation of the streams that is the salient element of the present invention, followed by the selective treatment (or in the case of the intermediate cut the non

treatment as part of the heavy fraction), all to the advantage of the better product with lower equipment cost; whereas Fletcher is primarily a pretreatment followed by a fractionation.

It is submitted that although this is better art than that used in the first appeal, the reference on its face as analyzed above cannot in any manner suggest the present invention as claimed, and the rejection fails to make out a *prima facie* case of obviousness. The examiner has numerous statements that the various steps in the present claimed process are "obvious", however there is no evidence of that. It is mere conjure and speculation. It is well settled that a rejection based on § 103 must rest upon a factual basis rather than conjure or speculation. "Where the legal conclusion of [of obviousness] is not supported by the facts it cannot stand." *In re Warner*, 379 F.2d 1011, 1017, 154 USPQ 173, 178 (CCPA 1967); see also *In re Sporck*, 301 F.2d 686, 690, 133 USPQ 360,364 (CCPA 1962). "Obviousness cannot be established by combining teachings of the prior art to produce the claimed invention, *absent* some teaching suggestion or incentive supporting the combination." *In re Geiger*, 2 USPQ2d 1276 (CAFC 1987). Hence, without the requisite teaching, suggestions or incentives there is no *prima facie* case and the rejection must fail. The court was addressing piecemeal combination of teachings, which could be argued met the claims, however, the proposed combination does not even meet the claims of the present invention and does not even rise to the level of putative *prima facie* case. See also *In re Fine*, 5 USPQ2d 1596 and *Ex parte Levengood*, 28 USPQ2d 1300 (BdPatApp 1993).

A determination of obviousness must involve more than indiscriminately combining

prior art; a motivation or suggestion to combine the art must exist. *ACS Hosp. Sys., Inc. v. Montefiore Hosp.* 221 USPQ 929,933 (Fed. Cir. 1984); *Micro Chemical Inc. v. Great Plains Chemical Co.*, 41 USPQ2d 1238, 1244 (fed. cir. 1997). The examiner can satisfy the burden of showing obviousness of the combination "only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references", *In re Lee*, 61 USPQ2d 1430, 1434 (Fed. Cir. 2002), citing *In re Fritch*, 972 F.2d 1260, 1265, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992). In the present situation the record contains no evidence of a motivation, the mere assertion of the by the examiner not being "objective prior art" to present such evidence.

C. Conclusion

In summary, it is clear that Fletcher and the present inception have the same goal, obtain gasoline with as much olefinic material for octane as possible, however Fletcher accepts as inevitable, the loss of olefinic material in the heavies, whereas the present provides a process that saves a portion of the olefins lost by Fletcher.

Applicant respectfully requests that the board reverse the examiner.

Respectfully Submitted



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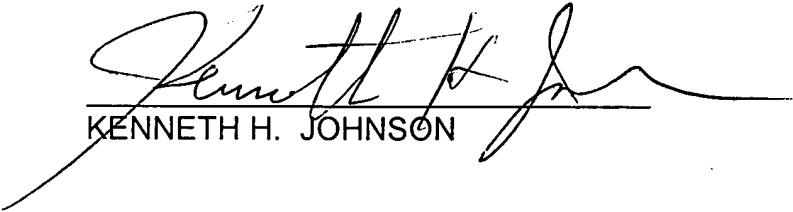


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KENNETH H. JOHNSON



IX. APPENDIX

A. CLAIMS ON APPEAL

11. A process for reducing the organic sulfur content of a full boiling range cracked naphtha stream containing olefins, diolefins, mercaptans, thiophenes, and other organic sulfur compounds, comprising the steps of:

(a) separating the full boiling range cracked naphtha stream into three fractions comprising a light cracked naphtha fraction boiling in the range of C_5 to about 150°F , an intermediate cracked naphtha fraction boiling in the range of about 150 to about 250°F and a heavy cracked naphtha boiling in the range of about 250 to 450°F ;

(b) subjecting the heavy cracked naphtha to hydrodesulfurization in a first hydrodesulfurization reactor containing a hydrodesulfurization catalyst;

(c) combining the effluent from the first hydrodesulfurization reactor with the intermediate cracked naphtha and subjecting the combined stream to hydrodesulfurization in a second hydrodesulfurization reactor and

(d) subjecting said light cracked naphtha to a wet caustic wash after said fractionation wherein substantially all of the mercaptans contained therein are converted to sulfides.

12.(new): The process according to claim 11 wherein said hydrodesulfurization catalyst comprises Group VIII metals.

13. The process according to claim 12 wherein said hydrodesulfurization catalyst

comprises cobalt, nickel, palladium, alone or in combination with other metals.

14. The process according to claim 12 wherein said hydrodesulfurization catalyst comprises components from Group V, VIB, VIII.

15. The process according to claim 14 wherein said hydrodesulfurization catalyst is cobalt-molybdenum, nickel-molybdenum or nickel-tungsten.

16. The process according to claim 15 wherein said hydrodesulfurization catalyst is supported on alumina, silica-alumina, or titania-zirconia.